PROJECT facts

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

VISION 21

06/2000

VIRTUAL DEMONSTRATION TO MODEL FUTURE PLANTS

PRIMARY PARTNER

Fluent, Incorporated
Lebanon, NH

TOTAL ESTIMATED COST

$2,262,578

COST SHARING

DOE	$1,500,000
Non-DOE	$762,578

WEB SITE

www.netl.doe.gov

Description

Fluent, Inc. and its partners will begin building a "virtual demonstration" system that would give future plant designers a way to model a fully functional Vision 21 plant on a computer. A virtual demonstration would rely on an integrated suite of codes that includes submodels for Vision 21 plant subsystems and components, dynamic response and process control, and visualization capabilities. Knowledge about the process and physical plant captured in computer models would be linked together to illustrate equipment configuration and orientation and to simulate plant operation.

The Fluent project addresses the integration of flowsheet-level models, e.g. Aspen Plus, with computational fluid dynamics (CFD) models, e.g. FLUENT, and other models that describe the details of what is happening inside process equipment such as gasifiers, combustors, heat exchangers, turbines, and chemical reactors. It is currently not known how to integrate CFD-scale models with flowsheet-scale models in such a way that the performance predicted by the CFD model is captured at the flowsheet level. Yet, it is important to have this capability because what happens within key process equipment affects overall plant performance. In order to meet Vision 21 goals, this capability becomes essential because optimum performance must be extracted from complex, tightly integrated configurations of advanced technology modules.

Goals

The goals of the project are to integrate models at the following scales:

- CFD and other detailed equipment models for the design, analysis, and visualization of key equipment.
- Flowsheet level models, both steady state and dynamic simulation, for optimal process and control system design, and analysis and evaluation of process flowsheets.
- Proprietary design codes used by manufacturers such as ABB Alstom Power that describe specific systems or pieces of equipment.

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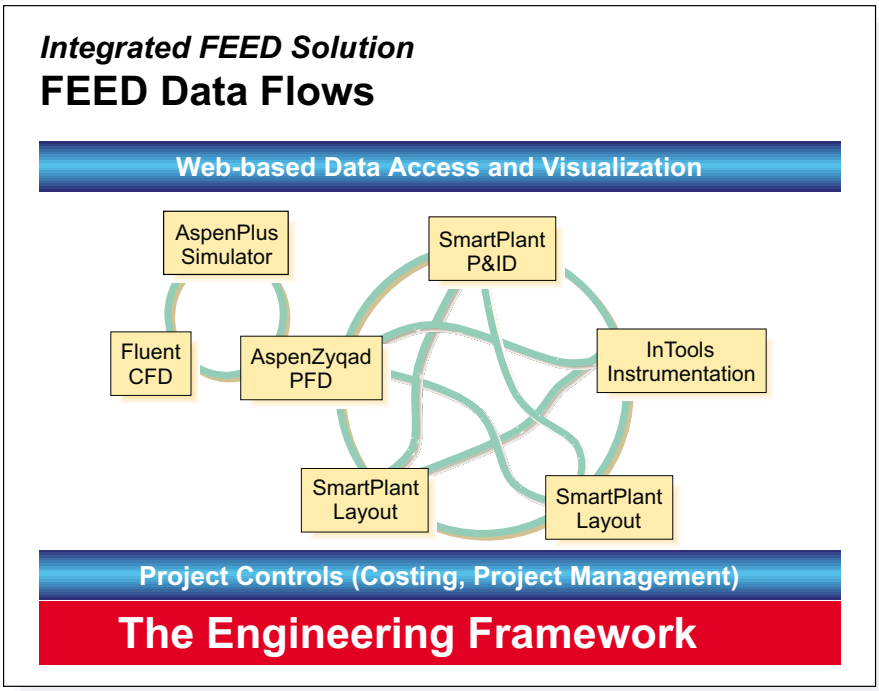
Virtual Demonstration to Model Future Plants

Benefits

Virtual demonstration can ensure that Vision 21 technology modules and components are used effectively and that the resulting integrated design optimizes economic, environmental, safety, control, and operability objectives and tradeoffs. The benefits of integrating flowsheet- and equipment-scale models include:

- Speeding up the design process.
- Improving system performance by allowing system designers to explore a wider range of parameters and to optimize plant subsystems and components in the context of the whole process, rather than in isolation.
- Ensuring that Vision 21 systems achieve efficiency and environmental performance targets by bringing detailed knowledge of technology models into the overall process design.



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Intergraph
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